

UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

3D Systems, Incorporated,

Plaintiff,

v.

Envisiontec, Incorporated, *et al.*

Defendants.

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Case No. 2:05-cv-74891

Hon. Avern Cohn

Magistrate Judge  
Hon. R. Steven Whalen

**SPECIAL MASTER'S CLAIM CHARTS FOR U.S. PATENT  
NOS. 5,630,981; 5,651,934; 5,902,537; AND 4,999,143**

## SPECIAL MASTER'S CLAIM CHART

U.S. Patent No. 4,999,143	Special Master's Claim Interpretation
<p>35. An apparatus for <b>producing a three-dimensional object</b> from a medium capable of selective physical transformation upon <b>exposure to synergistic stimulation from an object representation</b> specifying a first object surface to be spaced from a second surface by a spacing, and at least partially opposing the second surface, comprising:</p>	<p>The phrases “producing a three-dimensional object” and “exposure to synergistic stimulation” are unambiguous and need not be interpreted or limited.</p> <p>The phrase “from an object representation must be construed to mean data that represents adjacent or successive cross sections of the object. The compilation of the object data into slices or layers is crucial to the disclosed stereolithographic process. This meaning also comports with the description later in the claim of the receiving and forming means as comprising “means for forming said object substantially layer by layer.”</p>
<p>at least one <b>computer programmed to form a support representation</b></p>	<p>This claimed element is expressed clearly. It means that a computer programmed or having instructions to produce data relating to a support for the three-dimensional object.</p>
<p>specifying a <b>removable support</b> to be <b>formed in said spacing out of a material substantially layer by layer,</b></p>	<p>In the context of the ‘143 Patent, a removable support is a structure that is not a part of the finished object and which provides reinforcement to the object or portions of the object and can be separated from the object. The support is “created in the space between the first and second surfaces by successively solidifying curable liquid cross sections.</p>
<p>said support in cross sectional width being <b>thin</b>, and comprising a solid which extends along a path connecting said first and second surfaces, the path having a vertical path component which is greater than any horizontal path component; and</p>	<p>In the context of the ‘143 patent and its file history, the word “thin” means substantially smaller in width than in height to facilitate the easy removal of the support from the object.</p>
<p><b>means for receiving said support representation, and for forming said three-dimensional object out of said medium substantially layer by layer and also for forming said support out of said material substantially layer by layer, in accordance with said object and support representations];</b></p>	<p>This clause is a means-plus-function clause. The identified functions are as follows: receiving the support representation; and forming the three-dimensional object and the support out of the material substantially layer by layer in accordance with the object and support representations. This means includes a computer programmed to receive data files representing (a) cross sections of the object and</p>

	(b) cross sections of the support, a fluid medium capable of solidification in response to synergistic stimulation, and a source of synergistic stimulation to which the material is exposed to form successive solidified layers, each at the surface of the last formed building material layer and each representing an adjacent cross section of the object and support, respectively.
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## SPECIAL MASTER'S CLAIM CHARTS

U.S. Patent No. 5,630,981	Special Master's Claim Interpretation
11. A method of <b>producing a three-dimensional object</b> from a [medium] <u>photopolymer</u> capable of selective physical transformation when <b>subjected to [prescribed radiation] <u>light</u></b> , said method comprising the steps of:	The preamble of claim 11 requires no interpretation. As to the term, photopolymer, a photopolymer is a light sensitive plastic that cures or solidifies when exposed to light. The term "light" embraces light that is visible or invisible to the human eye, <i>e.g.</i> , ultraviolet light.
providing said [medium]: <u>photopolymer</u>	No interpretation is necessary.
<b>providing said [prescribed radiation] <u>light</u></b> ;	No interpretation is necessary. The source of the light may be stationary or moving.
<b>providing data representing the three-dimensional object</b> to be formed which was generated on CAD system;	This limitation should be interpreted as though it included the qualifying phrase "adjacent cross sectional layers of" after the word "representing." This construction comports with the invention that is disclosed in the '981 patent. This construction also provides an antecedent basis for the last limitation of claim 11 which sets forth the step of "forming and adhering successive cross sectional layers. . . . by exposing the photopolymer to said light in response to <u>said data</u> ." In the circumstances, the data representing the three-dimensional object referred to in this step must be data that is representative of adjacent cross sectional layers of the object.
<b>forming a first cross-sectional layer</b> of structure by <b>exposing said [medium] <u>photopolymer</u></b> to said <b>[prescribed radiation] <u>light</u></b>	No interpretation is necessary. As a matter of clarification, "forming" means curing or solidifying. A cross sectional layer is a section of the three-dimensional object made by a plane cutting through the object.
<b>forming successive layers of [medium] <u>photopolymer</u></b> adjacent to any <b>previously formed cross-sectional layers</b> of structure	No interpretation is necessary with the clarification of the word "forming" provided above.
<b>forming and adhering successive cross-sectional layers</b> of structure to any <b>previously formed cross-sectional layers</b> of structure	No interpretation is necessary with the clarification of the word "forming" provided above.

by exposing said [medium] **photopolymer** to said [prescribed radiation] **light** in response to said data.

whereby a plurality of adhered cross sectional layers of structure form the three-dimensional object.

The “said data” referred to in this last step of claim 11 is the data which is representative of adjacent cross sectional layers of the object.

## SPECIAL MASTER'S CLAIM CHART

U.S. Patent No. 5,651,934	Special Master's Claim Interpretation
<p>2. A method for <b>stereolithographically forming a portion of a three-dimensional object</b> wherein a <b>subsequent layer</b> of the three-dimensional object is <b>formed over a previously formed layer</b> of the object, comprising the steps:</p>	<p>No interpretation is necessary except for the description that a subsequent layer of the three-dimensional object is formed over a previously formed layer. Formed over means "formed on top of."</p>
<p>a) holding a volume of a building material having a working surface wherein the building material is capable of selective physical transformation upon <b>exposure to prescribed synergistic stimulation</b>;</p>	<p>The term "synergistic stimulation" embraces electromagnetic radiation emitted by stationary and moving light sources, particle beams and reactive chemicals.</p>
<p>b) <b>forming a uniform coating of desired layer thickness over the previously formed layer</b>, including <b>sweeping a [smoothing element] winged blade</b> at least once <b>over the previously formed layer</b> said [smoothing element] <b>winged blade</b> having a plurality of substantially separate members on a lower surface thereof for contacting the building material; and</p>	<p>The term "uniform" means a "smooth, level coating." After the word "coating," the phrase "of uncured building material" could be added for greater clarity of meaning.</p> <p>The step of sweeping means that a device having two wings with sides that are at angles with respect to the surface of the material is moved across the upper surface of uncured building material to sweep away excess curable liquid and thereby create a uniform coating of desired or predetermined thickness over the previously cured layer of building material.</p>
<p><b>applying a prescribed pattern of synergistic stimulation</b> to the building material at the working surface to transform at least a portion of the building material to <b>form the subsequent layer</b>.</p>	<p>This step covers electromagnetic radiation emitted by stationary and moving light sources, particle beams and reactive chemicals. To form the subsequent layer means simply the solidification or curing of the uniform coating of desired layer thickness.</p>

## SPECIAL MASTER'S CLAIM CHARTS

U.S. Patent No. 5,902,537	Special Master's Claim Interpretation
81. An apparatus for <b>forming at least a portion of a three-dimensional object</b> on a substantially <b>cross-sectional basis</b> from a material capable of physical transformation upon <b>exposure to synergistic stimulation</b> , comprising:	The preamble describes stereolithography as that term has been defined and used consistently throughout the four patents that 3D has designated for trial. The preamble is fairly descriptive of the stereolithographic process. To the extent that the preamble might be clarified for ease of understanding it can be rewritten this way: "An apparatus for making all or part of a three-dimensional object by solidifying successive cross sections of the object from a curable liquid upon exposure to synergistic stimulation."
<b>means for supplying data descriptive of the object</b>	The means referred to is a computer or equivalent that supplies data that is descriptive or representative "of adjacent cross sectional layers of the object." This interpretation is consistent with the invention of the '537 Patent and provides an antecedent basis for the function of the source of synergistic stimulation claimed in the last element of this claim.
a container for containing a volume of material having a working surface;	No interpretation is necessary
<b>an applicator for forming layers of material over at least portions of previously formed object cross sections, the applicator having a bottom opening located in proximity to the working surface;</b>	The parties agree that the element is a device that applies and smoothes the building material. The function may be expressed as "coating a building material layer on top of part or all of a previously solidified object cross section."
<b>a vacuum pump coupled to the applicator for drawing up material from the working surface through the bottom opening and into the applicator</b>	The definition of "vacuum pump" is found in the '537 Patent. It means a device that creates a difference in pressure. It is because of the pressure difference that "building material will be drawn up into applicator 310." ('537 patent, col. 38, ll. 20-45)
<b>means for sweeping the applicator across at least a portion of at least some of the previously formed object cross sections</b>	The language of this means-plus-function element may be defined as a "frame and motor-driven threaded shaft system" and equivalents thereof that perform the sweeping function recited in the claim.

<b>a source of synergistic stimulation for exposing the layers according to the descriptive data, to form the at least portion of the object from a plurality of object cross sections</b>	<p>This element means a device that generates synergistic stimulation. The device may be a stationary or moving light source, a particle beam generator or a source of reactive chemicals.</p> <p>This function may be interpreted to read: “for exposing the layers of curable liquid according to the data descriptive of adjacent cross sectional layers of the object to form the at least portion of the object from a plurality of object cross sections.</p>
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**CERTIFICATE OF SERVICE**

I hereby certify that on June 5, 2007, I electronically filed the foregoing with the Clerk of the Court using the ECF system which will send notification of such filing to the following:

Susan M. Kornfield [skornfield@bodmanllp.com](mailto:skornfield@bodmanllp.com)  
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I declare under penalty of perjury that the foregoing statements are true and correct.

  
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